

# *Lucanus gradivus* n. sp. from Vietnam, with new records of *L. fujitai* Katsura & Giang from Vietnam and Laos (Coleoptera, Lucanidae)

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**Abstract** - *Lucanus gradivus* n.sp. from Vietnam is described. It belongs to the large of *L. fortunei* Saunders, 1854 species group and is closely related to *L. fujitai* Katsura & Giang 2002. *Lucanus gradivus* differs mainly through the stronger and differently denticulated mandibles, larger and more pronounced posterolateral corners of the cephalic lobes, and the aedeagus, with longer flagellum, shorter and thinner median lobe, and longer apically curved parameres.

**Key words:** Lucanidae, *Lucanus*, new species, Vietnam.

**Riassunto** - *Lucanus gradivus* n. sp. del Vietnam, con nuove segnalazioni di *L. fujitai* Katsura & Giang, 2002 da Vietnam e Laos (Coleoptera, Lucanidae).

Viene descritto *Lucanus gradivus* n.sp. del Vietnam. La nuova specie appartiene al grande gruppo di specie del *L. fortunei* Saunders, 1854 ed è strettamente affine a *L. fujitai* Katsura & Giang 2002. *Lucanus gradivus* differisce soprattutto per le mandibole, più robuste e differenzialmente denticolate, gli angoli posterolaterali delle creste cefaliche, più ampie e più pronunciate e l'edeago, con flagello più lungo, lobo mediano corto e sottile e parameri più lunghi e fortemente incurvati all'apice.

**Parole chiave:** Lucanidae, *Lucanus*, nuova specie, Vietnam.

## INTRODUCTION

*Lucanus fujitai* was originally described by Katsura & Giang (2002) on a small series of specimens coming from Sapa, Fan Si Pan Mountains in Lao Cai Province, northern Vietnam. Since then very few specimens were collected in that area. Recently, Huang & Chen (2013) in their monumental work on Chinese Lucanidae, recorded *L. fujitai* from Jinping in South-eastern Yunnan, China. In the last few years, our colleagues

Thanh Luong Le, Thai Quang Nguyen and Steeve Colard provided us with several *Lucanus* specimens from Lai Chau and Yen Bai provinces in north Vietnam and Houaphan Province in north Laos. Among them, we identified several *L. fujitai* specimens coming from new localities and an interesting new species, belonging to the *Lucanus fortunei* Saunders, 1854 species-group and closely related to *L. fujitai*, herewith described as *Lucanus gradivus* n.sp.

## MATERIALS AND METHODS

Pictures were taken by a Sony DSC-HX90V digital camera.

Photographs of genitalia were taken by a Canon PowerShot S50 digital camera mounted on a Leica MS5 stereomicroscope and processed through the Combine ZP software. The specimens are deposited in the following institutions or private collections:

### Depositories

JSC Jin Sato Collection, Sendai, Japan.  
MSNM Museo di Storia Naturale, Milano, Italy.  
MZC Michele Zilioli Collection, Albizzate, Italy.  
KPM Kanagawa Prefectural Museum of Natural History, Odawara, Japan

### *Lucanus gradivus* n. sp. (Fig. 1a-c)

#### Type material

Holotype ♂: Vietnam, Mu Cang Chai, Yen Bai Prov., VI. 2015, local collector leg. (deposited at the MSNM).

#### Paratypes

2 ♂♂, same locality as the holotype, V.2015 (JSC, MZC); 1 ♂, Vietnam, Yen Bai Prov., VI.2015, local collector leg. (JSC); 1 ♂, same locality, VI.2017 (JSC); 2 ♂♂, Vietnam, Lai Chau Prov., VI.2015 (JSC); 1 ♂, Vietnam, Ha Giang Prov., VI.2016 (JSC).

#### Holotype (Fig.1-b).

Length, including mandibles: 56.9 mm. Length without mandibles: 37.7 mm. Maximum head width, excluding mandibles: 17.2 mm.

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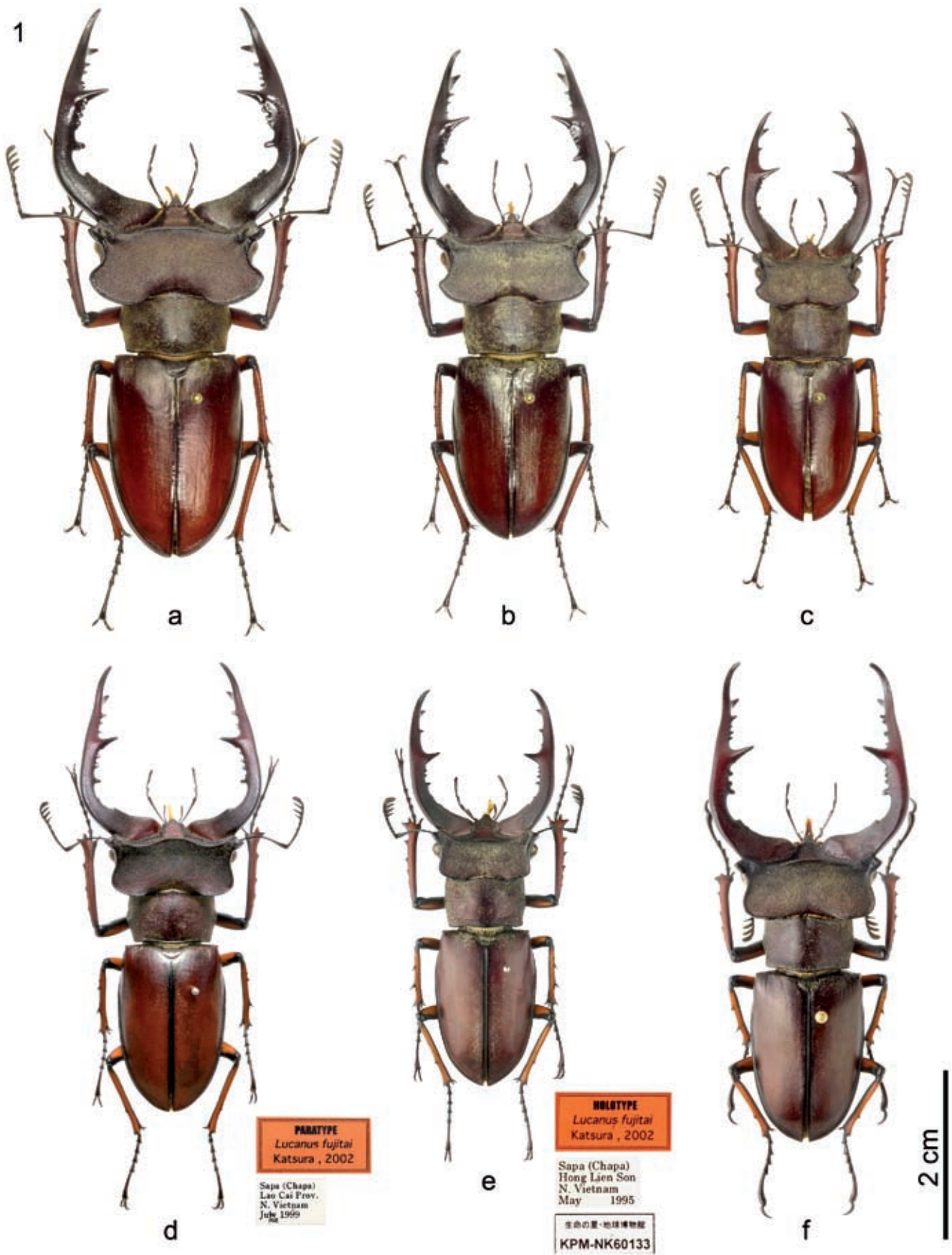


Fig. 1 - a-c) *Lucanus gradivus* n.sp. a, c: paratype males, JSC; b: holotype male, MSNM. d-f: *Lucanus fujitai* Katsura & Giang. d: paratype male, Vietnam, Coll.Higuchi; e: holotype male, Vietnam, KPM; f: male, Laos, MZC.

Body slender, dark reddish brown, strongly punctate throughout, coated with sparse appressed yellowish pubescence. Elytra reddish brown with a narrow lateral and sutural black border; antennae and palpi black; legs with tarsi and coxae black, femora ferruginous with base, apex and edges black, tibiae ferruginous with black apices.

Head. Transverse (W/L: 2.10), matt, finely and irregularly rasp-like granulose, covered by a dense yellowish appressed pubescence and ridged along most of its profile. Head laterally broadly concave, posterolaterally with strong, wide, protruding beyond the eyes level, lobes; posterior margin widely concave. Anterolateral cephalic angles strongly protruding, more prominent than the eyes. Ocular canthus shorter than half eye's diameter. Frons trapezoidal, slightly concave, fused with the epistoma. Transverse clypeal ridge strong, medially interrupted, laterally projecting as two blunt teeth; epistoma triangular, its apex rounded and fringed with yellowish hairs. Frontal ridge bisinuate, feebly raised and weakly convex. Mandible long, moderately robust, strongly bent at its proximal third, then almost straight up to its slightly curved apex; feebly shining, distinctly microsculptured proximally and sparsely punctured distally, with short, relatively sparse yellowish pubescence basally. Median tooth strong, triangular, sharp, slightly tilted forwards and upwards, placed after the mid-length. Inner mandibular margin with a proximal strong serrated carina followed by a diastema, a strong blunt tooth, a serrated edge tipped by the median tooth, and 2-3 distal small denticles. Upper apical tooth bent upwards, with a sharp, well-marked dorsal carina; lower apical tooth shorter, conical, slightly directed forwards.

Antennal club 4-jointed; joints 8-10 bearing a strong, long, pubescent lamella; joint 7 with a shorter and thinner lamella, pubescent only anteriorly and with scattered setae elsewhere. Mentum wide, trapezoidal, matt, finely and irregularly granulose, covered with sparse yellowish pubescence, which is longer along mentum sides; anterior margin medially strongly convex and with broadly rounded corners.

Thorax. Pronotum transverse (W/L: 1.74), matt, finely punctured, coated with moderately dense, appressed yellowish pubescence; median longitudinal depression shallow, distinct in its anterior half, almost wanting in the posterior one; anterior corners rounded, posterior ones slightly protruding. Prosternal apophysis strong, prominent, apically rounded, laterally covered with yellowish pubescence. Scutellum transverse, rounded posteriorly, finely punctate and microreticulate, coated with appressed yellowish pubescence, except for a narrow smooth lateral margin. Elytra finely and densely punctate throughout, superficially microreticulate, coated with sparse yellowish pubescence, which is much longer and denser proximally. Shoulders toothed.

Legs slender, fairly shining, microreticulate with large, shallow, unevenly scattered punctures and with sparse, short yellowish pubescence, even shorter on fore tibiae. Fore tibiae with four (left) or five (right) spines on their outer edge, mid tibiae three-spinose; hind tibiae with two very small and weakly protruding preapical teeth.

Aedeagus robust (total length 5.97 mm) (Fig. 2), with short and apically widened flagellum; median lobe slender, shorter than parameres; the latter strongly curved, apically protruding.

### Paratype males

Consistent with the holotype except for the usual allometric differences. Larger male with more pronounced morphological characters, and smaller one with, e.g., mandibles less curved and only feebly denticulated.

### Derivatio nominis

This species is named after "Gradivus" a cult epithet of the god of war Mars, used here in reference of the combative and robust appearance.

### Comparative notes

*Lucanus gradivus* n. sp. is closely related to *L. fujitai* and both belong to the very large *Lucanus fortunei* species-group. However, *L. gradivus* n. sp. can be easily distinguished at glance from *L. fujitai* through the comparison Table 1.

Tab. 1 - Comparison between *Lucanus gradivus* n. sp. and *Lucanus fujitai*.

<i>Lucanus gradivus</i> n. sp. (Fig. 1 a-c)	<i>Lucanus fujitai</i> Katsura & Giang (Fig. 1 d-f; Fig. 3)
Mandible moderately robust. Surface weakly shining, distinctly microsculptured proximally and sparsely punctate distally.	Mandibles more slender. Surface matt with a distinct microsculpture, more dense proximally.
Inner mandibular margin with a proximal strong serrated carina followed by a diastema, a strong blunt tooth, a serrated edge tipped by the median tooth, and 2-3 distal small denticles.	Inner mandibular margin with a proximal strong unarmed carina followed by a diastema, a strong blunt tooth, 2-3 small separated denticles, the median tooth and 2-4 distal small denticles.
Frontal ridge bisinuate, feebly raised and weakly convex.	Frontal ridge bisinuate, strongly raised and more convex medially.
Clypeal ridge strong, medially interrupted, laterally distinctly projecting as two blunt teeth.	Clypeal ridge barely visible, laterally forming just distinct angles.
Posterolateral cephalic lobes strongly widened and protruding beyond the level of the eyes.	Posterolateral cephalic lobes less widened and not protruding beyond the level of the eyes.
Aedeagus with short and apically widened flagellum; median lobe slender, about half as long as the relatively long parameres.	Aedeagus with very short and weakly apically widened flagellum; median lobe stouter, about $\frac{3}{4}$ as long as the relatively short parameres.

New records of *Lucanus fujitai* Katsura & Giang (Fig. 1 d-f)





Fig. 2-3 – 2) *Lucanus gradivus* n.sp. Aedeagus – a) ventral view, b) dorsal view, c) lateral view, d) apex of flagellum. 3) *Lucanus fujitai* Katsura & Giang. Aedeagus. a) ventral view, b) dorsal view, c) lateral view, d) apex of flagellum.

Vietnam: 9 ♂♂, Mu Cang Chai Mt. 1700 m, Yen Bai prov., V-VI.2017, local collector leg.; 39 ♂♂, same locality, V.2016; 7 ♂♂, Mu Cang Chai Mt. H. Than Uyen district, Lai Chau prov., VI.2015, local collector leg.; 8 ♂♂, Yen Bai province, IV.2015, local collector leg.; 3 ♂♂, same locality, V.2014; 1 ♂, Van Chan Mt. Van Chan district, Yen Bai prov., IV.2013, local collector leg.; all preserved in JSC.

Laos: Mt. Phu Pan Tin, 1950 m, VI.2015, S.Collard leg. (MZC).

In the above mentioned localities, *L. fujitai* is sympatric with *L. gradivus* n. sp. and *Lucanus marazziorum* Zilioli (2012).

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### REFERENCES

- Huang H. & Chen C.C., 2013 – Further research on the genera *Lucanus* Scopoli and *Eolucanus* Kurosawa from China, with the description of two new species. In: Stag Beetles of China II. Huang H. & Chen C.C. (eds). *Formosa Ecological Company*: 1-34.
- Katsura N. & Giang D.L., 2002 – Notes on the genus *Lucanus* (Coleoptera, Lucanidae) from northern Vietnam with descriptions of two new species. *Gekkan Mushi*, Tokyo, 378: 2-14.
- Zilioli M., 2012 – Contribution to the knowledge of the stag-beetles of the genus *Lucanus* from Laos, with description of *Lucanus marazziorum* n. sp. (Coleoptera Lucanidae). *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale*, Milano, 153 (2): 267-276.